What is claimed is:

1. A method for filtering a signal communicated from a transmitter to a receiver via a communication path to reduce interference, comprising the steps of:

momentarily disrupting said transmitter from transmitting over said communication path;

analyzing interference on said communication path at the receiver during the momentary disruption to determine the frequency of at least one interference peak;

communicating information from the receiver to the transmitter identifying the frequency of the at least one interference peak;

pre-distorting said signal at the transmitter to accentuate the signal magnitude at the identified frequency;

communicating the pre-distorted signal to said receiver; and

filtering the pre-distorted signal at said receiver to attenuate the signal magnitude at the identified frequency.

2. A method in accordance with claim 1 wherein said analyzing step performs a real or complex signal frequency analysis on the interference to determine the frequency peak(s) thereof.

3. A method in accordance with claim 1 wherein said filtering at the receiver uses a transfer function that is the inverse of the transfer function used to pre-distort the signal at the transmitter.

4. A method in accordance with claim 1 wherein said filtering at the receiver uses the Z-transform transfer function:

$$H(z) = \frac{1 + 2\operatorname{Re}(\alpha) z^{-1} + z^{-2}}{1 - 2\operatorname{Re}(\alpha) R \cdot z^{-1} + R^2 \cdot z^{-2}}$$

where $\alpha = \exp(2j\pi\phi)$, ϕ is the normalized center frequency of the filter, and R is a constant.

5. A method in accordance with claim 4 wherein said pre-distortion at the transmitter implements the inverse transfer function $H(z)^{-1}$.

6. A method in accordance with claim 1 wherein:

said transmitter is periodically disrupted from transmitting over said communication path;

interference on said communication path is analyzed at the receiver during the periodic disruptions;

information is communicated from the receiver to the transmitter identifying changes in the interference peak(s) determined during the periodic disruptions; and

the transmitter pre-distorts the signal to accentuate the signal magnitude in accordance with the changes of the interference peaks.

7. A method in accordance with claim 1 wherein said analysis step identifies the frequency location(s) of the interference peak(s) in accordance with a power threshold level.

8. Apparatus for filtering interference in a signal communicated from a transmitter to a receiver via a communication path,

said receiver comprising:

a real or complex signal frequency analyzer adapted to analyze interference on the communication path during momentary disruptions of said signal to determine the frequency of at least one interference peak, and

means for communicating information from the receiver to the transmitter identifying the frequency of the at least one interference peak;

said transmitter comprising:

a filter adapted to pre-distort said signal at the transmitter to accentuate the signal magnitude at the identified frequency; and

said receiver further comprising:

a filter adapted to attenuate the signal magnitude of the pre-distorted signal at the identified frequency.

9. Apparatus in accordance with claim 8 wherein:

said communication path comprises a cable television system return path coupling a subscriber location to a cable television system headend,

said transmitter is provided at the subscriber location;

said receiver is provided at the cable television system headend; and

said interference comprises ingress noise.

10. Apparatus in accordance with claim 8 wherein: said transmitter communicates the pre-distorted signal to the receiver using digital modulation.

11. Apparatus in accordance with claim 8 wherein the filter at said receiver comprises a notch filter.

12. Apparatus in accordance with claim 11 wherein said notch filter has a Z-transform transfer function described by:

$$H(z) = \frac{1 + 2\,\mathrm{Re}(\alpha) z^{-1} + z^{-2}}{1 - 2\,\mathrm{Re}(\alpha) R \cdot z^{-1} + R^2 \cdot z^{-2}}$$

where $\alpha = \exp(2j\pi\phi)$, ϕ is the normalized center frequency of the filter, and R is a constant.

13. Apparatus in accordance with claim 12 wherein the pre-distortion filter at the transmitter implements the inverse transfer function $H(z)^{-1}$.

14. Apparatus in accordance with claim 13 wherein:

said complex signal frequency analyzer periodically analyzes interference on the communication path during momentary disruptions of said signal to determine changes in the interference peak(s) over time, and

said notch and pre-distortion filters are programmable to provide said signal attenuation and accentuation, respectively, at the interference peak(s) as the frequency of the peak(s) changes over time.

15. Apparatus in accordance with claim 8 wherein said complex signal frequency analyzer includes a threshold power level detector for use in determining the frequency of said at least one interference peak.

16. A method for filtering nonlinear distortion in a signal communicated from a transmitter to a receiver via a communication path, comprising the steps of:

pre-distorting said signal at the transmitter to accentuate the signal magnitude at a fixed frequency where said nonlinear distortion resides;

communicating the pre-distorted signal to said receiver; and

filtering the pre-distorted signal at said receiver to attenuate the signal magnitude at said fixed frequency.

17. A method in accordance with claim 16 wherein:

said signal is an integrally related carrier (IRC) television channel signal having composite second order (CSO) and composite triple beat (CTB) distortions present at different fixed frequencies; and

said CSO and CTB distortions are reduced by pre-distorting said signal at the transmitter to accentuate the signal magnitude at a first fixed frequency where said CSO distortion resides and a second fixed frequency where said CTB distortion resides, and filtering said signal at the receiver at said first and second fixed frequencies.

18. A method in accordance with claim 16 wherein:

said signal is a harmonically related carrier (HRC) television channel signal having composite second order (CSO) and composite triple beat (CTB) distortions present at a common fixed frequency; and

said CSO and CTB distortions are reduced by pre-distorting said signal at the transmitter to accentuate the signal magnitude at said common fixed frequency and filtering said signal at the receiver at said common fixed frequency.

19. Apparatus for filtering nonlinear distortion in a signal communicated from a transmitter to a receiver via a communication path, comprising:

a first filter at the transmitter to provide a pre-distorted signal having an accentuated magnitude at a fixed frequency where said nonlinear distortion resides; and

a second filter at the receiver adapted to filter the pre-distorted signal to attenuate the signal magnitude at said fixed frequency.

20. Apparatus in accordance with claim 19 wherein said second filter comprises a notch filter having a Z-transform transfer function described by:

$$H(z) = \frac{1 + 2\operatorname{Re}(\alpha) z^{-1} + z^{-2}}{1 - 2\operatorname{Re}(\alpha) R \cdot z^{-1} + R^2 \cdot z^{-2}}$$

where $\alpha = \exp(2j\pi\phi)$, ϕ is the normalized center frequency of the filter, and R is a constant; and

said first filter implements the inverse transfer function $H(z)^{-1}$.